

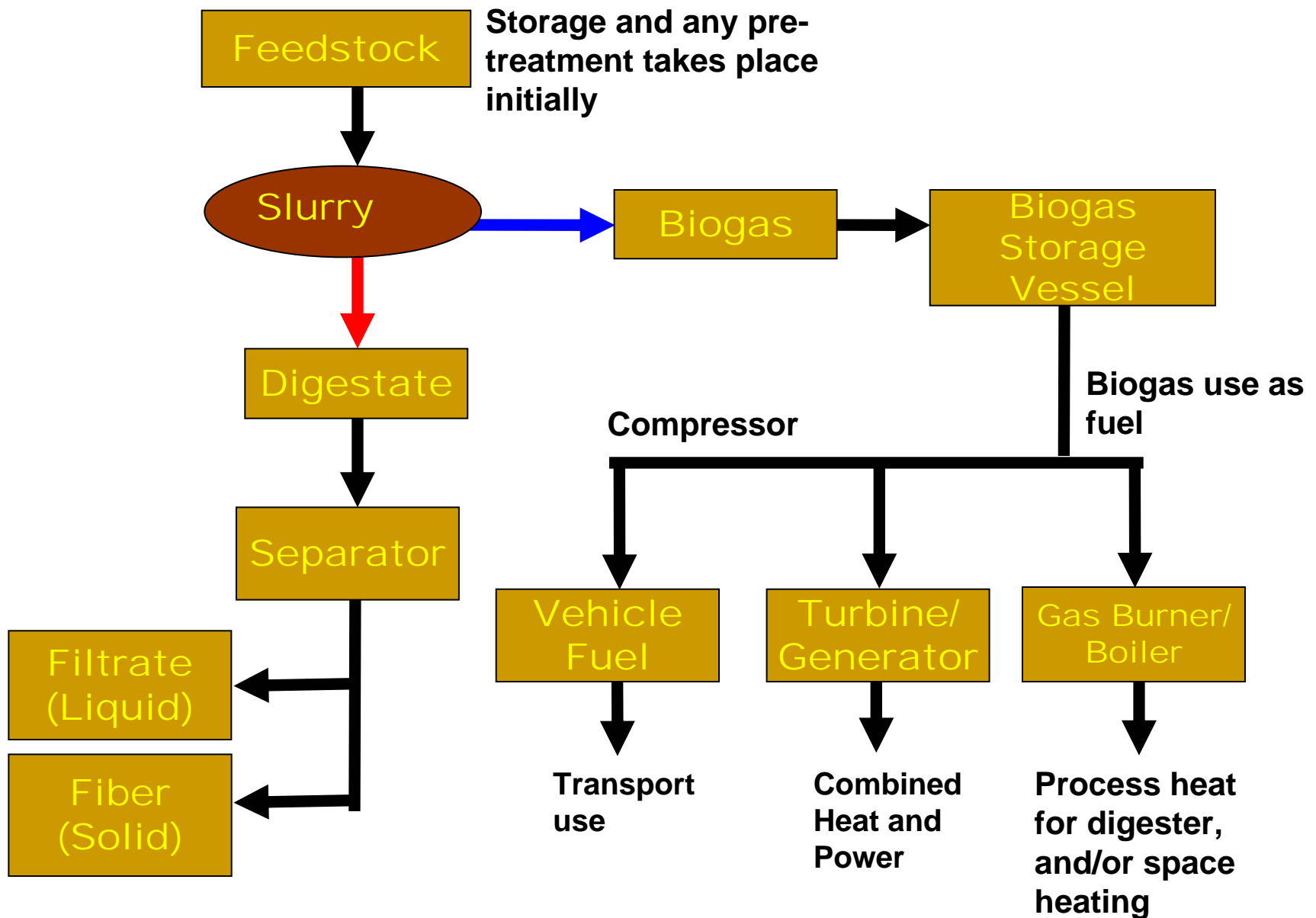
Anaerobic Digestion for Michigan Agriculture

Michelle Crook, P.E.

Michigan Department of Agriculture

What is Anaerobic Digestion?

- The process of decomposing organic waste such as manure or food waste in the absence of oxygen.
- Produces
 - biogas (methane, CO₂, and trace gases)
 - Solids (biofibers)
 - Liquid (high value fertilizer)



Energy From Livestock Wastes?

Michigan Livestock

53,000 Farms

200+ Large CAFOs

1,060,000 Cattle

324,000 Dairy Cows

→ 1 million Swine

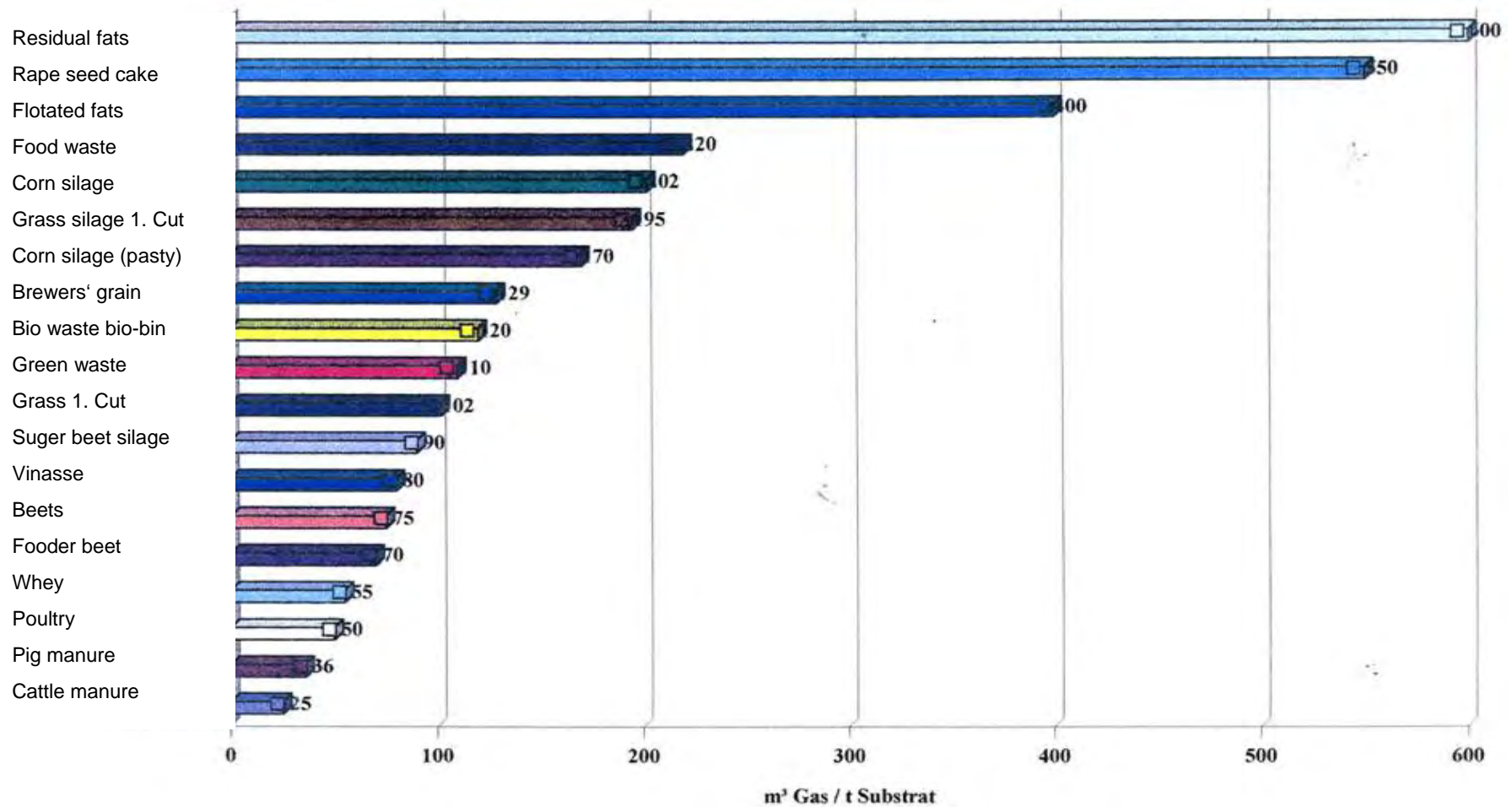
4.8 million Turkey



The manure from seven dairy cows can power a typical home.



Gas Yields of Ag Feedstocks



Michigan Digesters

- 8 Operational Systems
 - 4 Dairies
 - 1 Swine
- 3 Food Processors



Future

- Regional/Community Based Systems
 - 3 Pending Consideration
 - Treat Variety of Ag By-Products
 - Manures
 - Ethanol Syrup Stillage
 - Food Processing Residuals
 - Glycerin from Biodiesel
 - Pharmaceuticals
 - Organic Industrial Wastes
 - Animal Mortality

Current Michigan Roadblocks

- Environmental Regulatory Issues
- Lack of a Michigan Renewable Portfolio Standard
- Inadequate Net Metering Policy

Regulations Effecting Digesters

Michigan Natural Resources Environmental
Protection Act (NREPA) P.A. 451

Part 55 – Air Quality

Part 31 – Surface Water Quality

Part 21 – Ground Water Quality

Part 115 – Solid Waste

Part 121 – Liquid Industrial Waste

Michigan's Electricity Roadblocks

- 30 kW Maximum, No Wheeling, Limited to 1 Meter
 - California – 1 MW
 - Wisconsin – 800 kW
 - New York – 400 kW
- Michigan - \$0.03 – \$0.05 /kWh
 - \$0.08- \$0.18/kWh